

TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor Built-in Transistor)

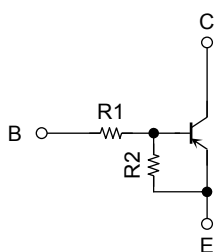
## RN2701JE, RN2702JE, RN2703JE RN2704JE, RN2705JE, RN2706JE

Switching, Inverter Circuit, Interface Circuit and  
Driver Circuit Applications

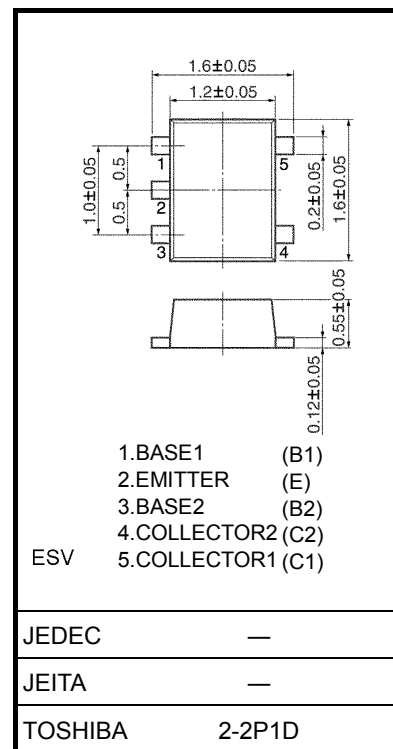
Unit: mm

- Two devices are incorporated into an Extreme-Super-Mini (5-pin) package.
- Incorporating a bias resistor into a transistor reduces parts count.  
Reducing the parts count enables the manufacture of ever more compact equipment and lowers assembly cost.
- Complementary to RN1701JE to RN1706JE

### Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2701JE	4.7	4.7
RN2702JE	10	10
RN2703JE	22	22
RN2704JE	47	47
RN2705JE	2.2	47
RN2706JE	4.7	47



Weight: 0.003 g (typ.)

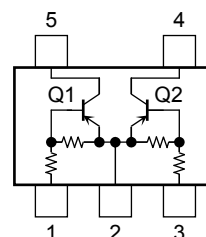
### Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 common)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	RN2701JE to 2706JE $V_{CBO}$	-50	V
Collector-emitter voltage	$V_{CEO}$	-50	V
Emitter-base voltage	RN2701JE to 2704JE $V_{EBO}$	-10	V
	RN2705JE RN2706JE	-5	V
Collector current	$I_C$	-100	mA
Collector power dissipation	RN2701JE to 2706JE $P_C$ (Note 1)	100	mW
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	-55 to 150	°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.  
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Total rating

### Equivalent Circuit (top view)

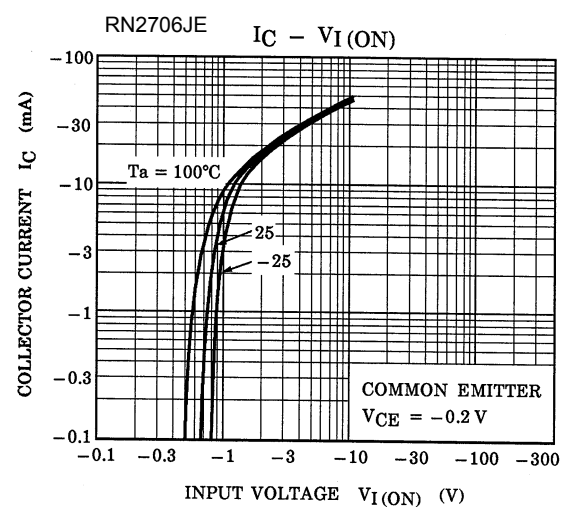
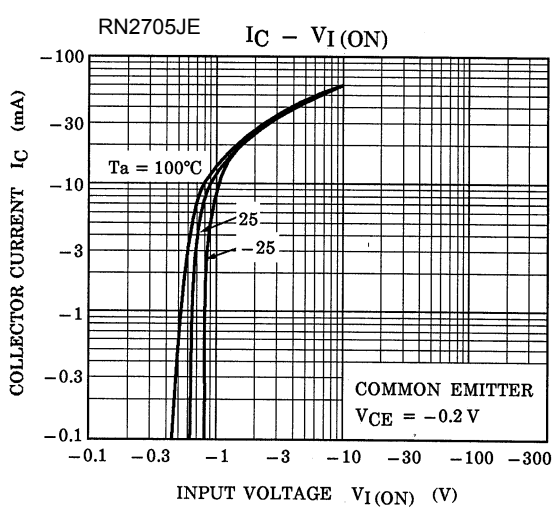
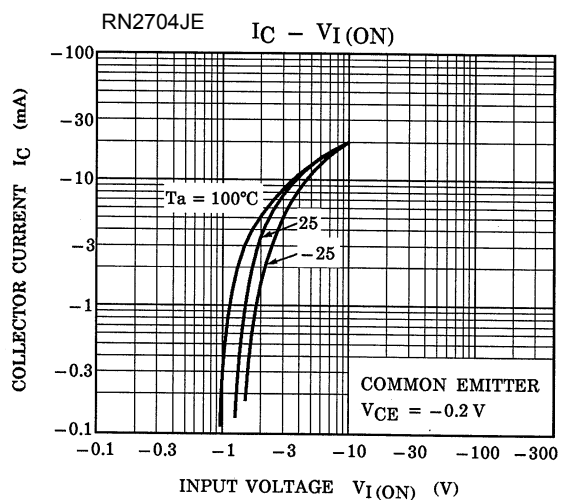
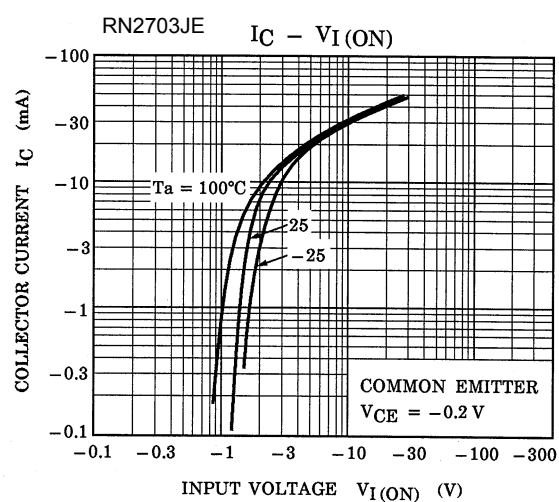
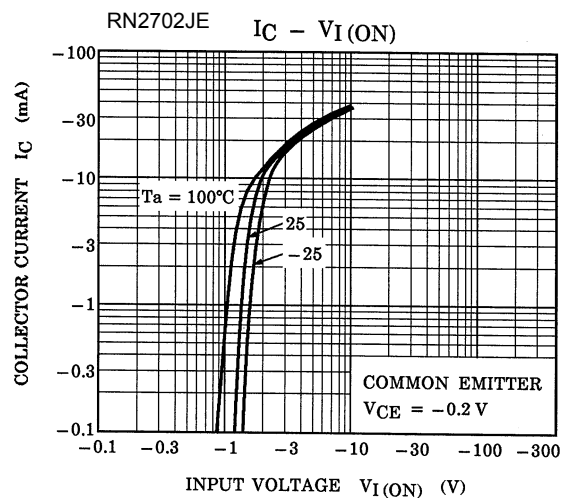
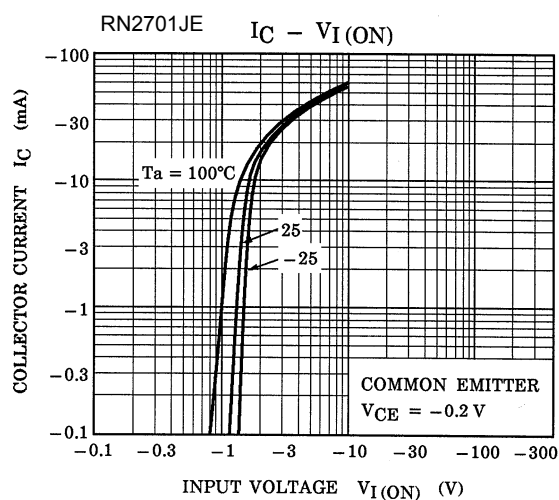


Start of commercial production  
2000-06

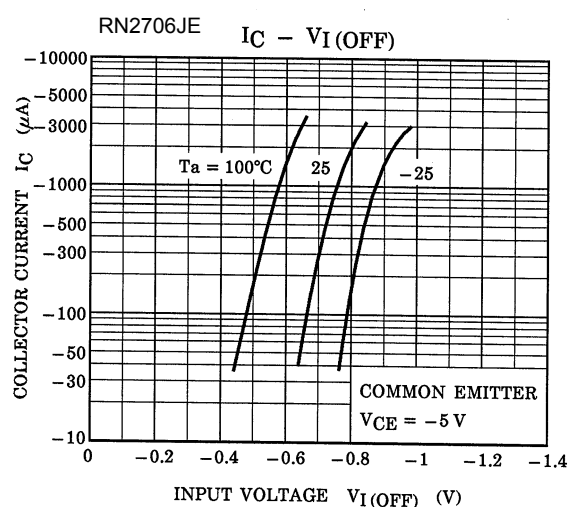
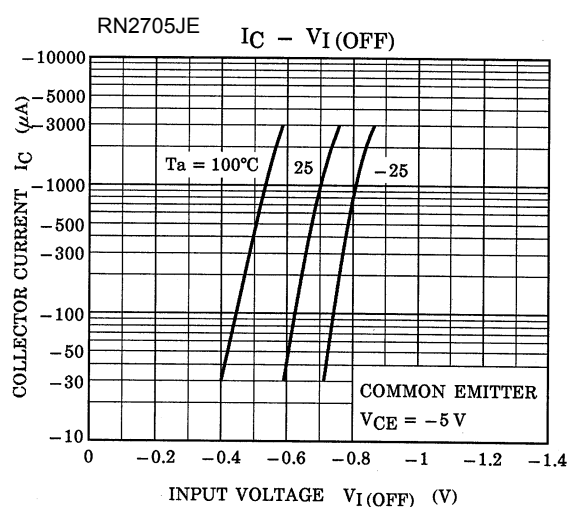
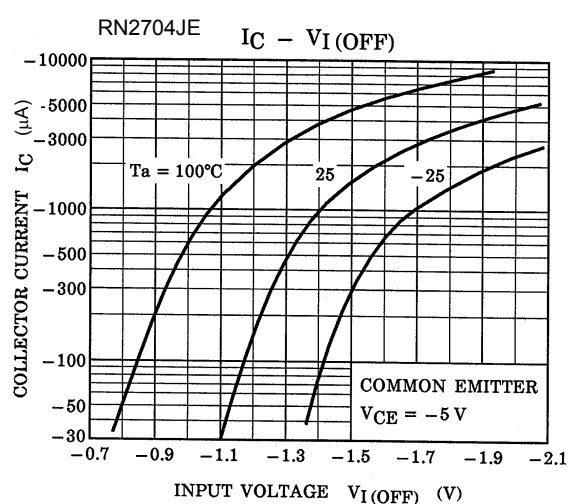
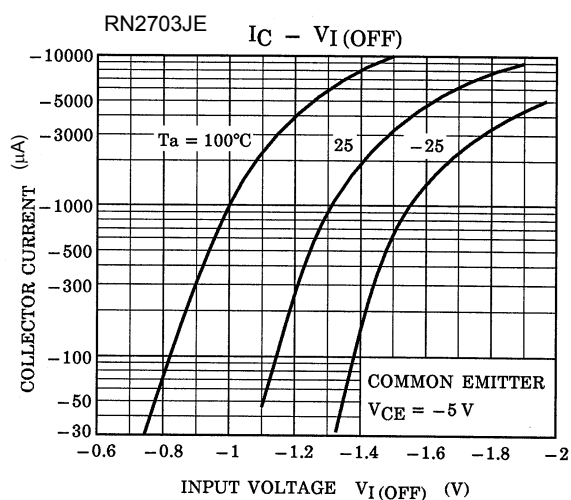
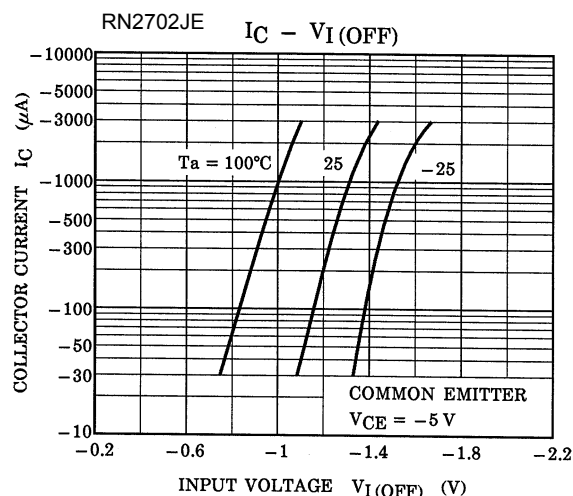
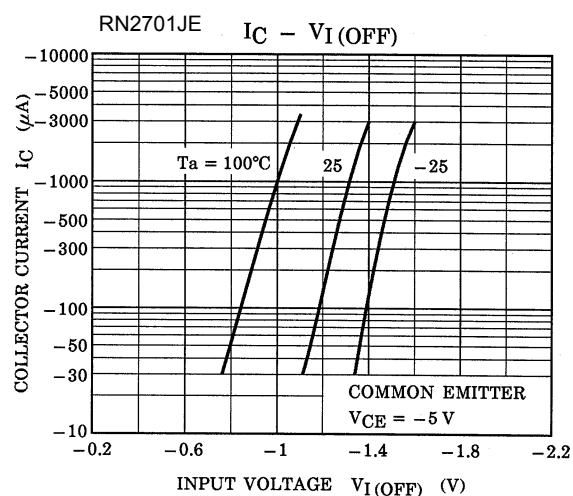
**Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)**

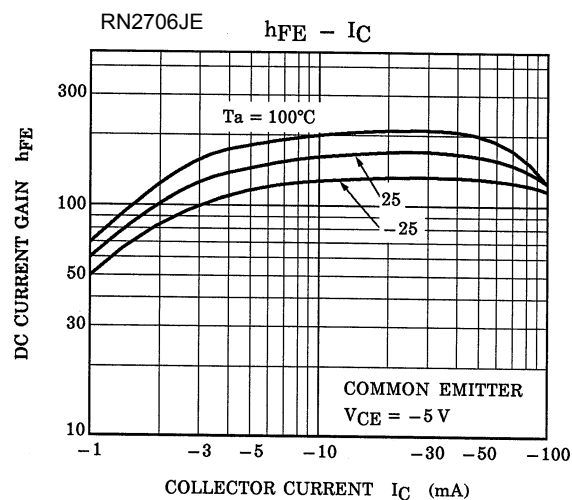
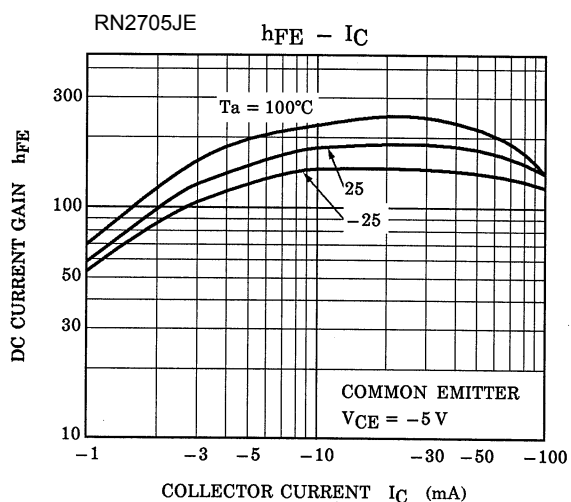
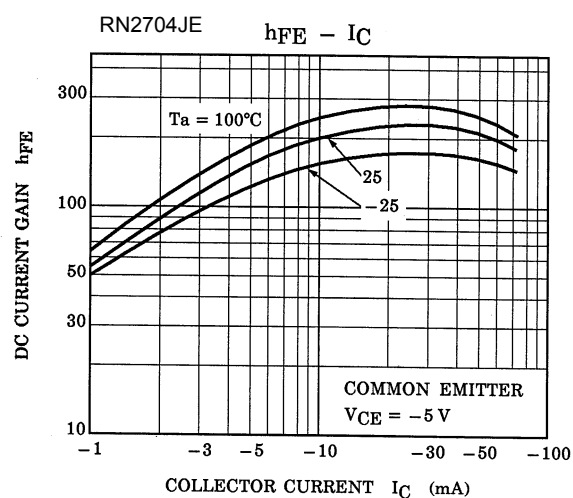
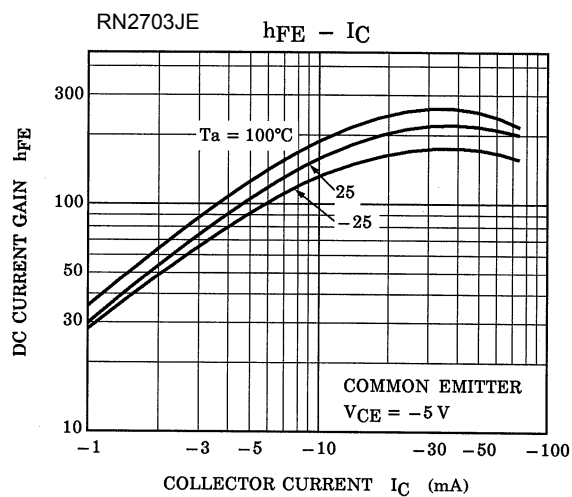
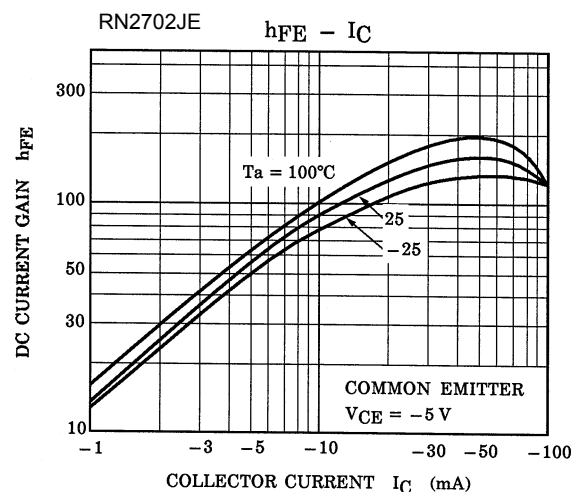
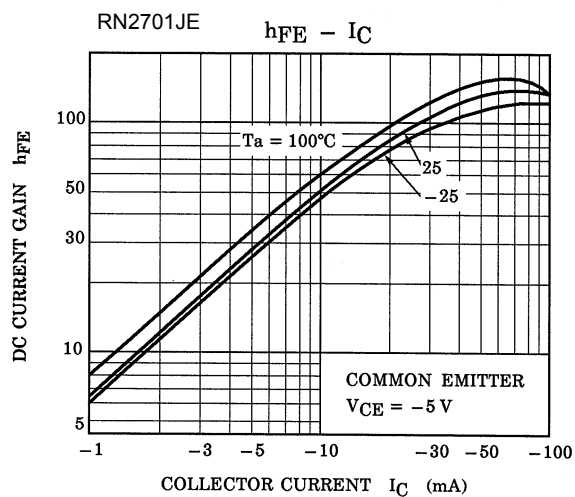
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2701JE to 2706JE	$I_{CBO}$	$V_{CB} = -50\text{ V}, I_E = 0$	—	—	-100	nA
		$I_{CEO}$	$V_{CE} = -50\text{ V}, I_B = 0$	—	—	-500	
Emitter cut-off current	RN2701JE	$I_{EBO}$	$V_{EB} = -10\text{ V}, I_C = 0$	-0.82	—	-1.52	mA
	RN2702JE			-0.38	—	-0.71	
	RN2703JE			-0.17	—	-0.33	
	RN2704JE			-0.082	—	-0.15	
	RN2705JE	$I_{EBO}$	$V_{EB} = -5\text{ V}, I_C = 0$	-0.078	—	-0.145	
	RN2706JE			-0.074	—	-0.138	
DC current gain	RN2701JE	$h_{FE}$	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	30	—	—	
	RN2702JE			50	—	—	
	RN2703JE			70	—	—	
	RN2704JE			80	—	—	
	RN2705JE			80	—	—	
	RN2706JE			80	—	—	
Collector-emitter saturation voltage	RN2701JE to 2706JE	$V_{CE(sat)}$	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	-0.1	-0.3	V
Input voltage (ON)	RN2701JE	$V_{I(ON)}$	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-1.1	—	-2.0	V
	RN2702JE			-1.2	—	-2.4	
	RN2703JE			-1.3	—	-3.0	
	RN2704JE			-1.5	—	-5.0	
	RN2705JE			-0.6	—	-1.1	
	RN2706JE			-0.7	—	-1.3	
Input voltage (OFF)	RN2701JE to 2704JE	$V_{I(OFF)}$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-1.0	—	-1.5	V
	RN2705JE, 2706JE			-0.5	—	-0.8	
Transition frequency	RN2701JE to 2706JE	$f_T$	$V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$	—	200	—	MHz
Collector output capacitance	RN2701JE to 2706JE	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	6	pF
Input resistor	RN2701JE	R1	—	3.29	4.7	6.11	kΩ
	RN2702JE			7	10	13	
	RN2703JE			15.4	22	28.6	
	RN2704JE			32.9	47	61.1	
	RN2705JE			1.54	2.2	2.86	
	RN2706JE			3.29	4.7	6.11	
Resistor ratio	RN2701JE to 2704JE	R1/R2	—	0.9	1.0	1.1	
	RN2705JE			0.0421	0.0468	0.0515	
	RN2706JE			0.09	0.1	0.11	

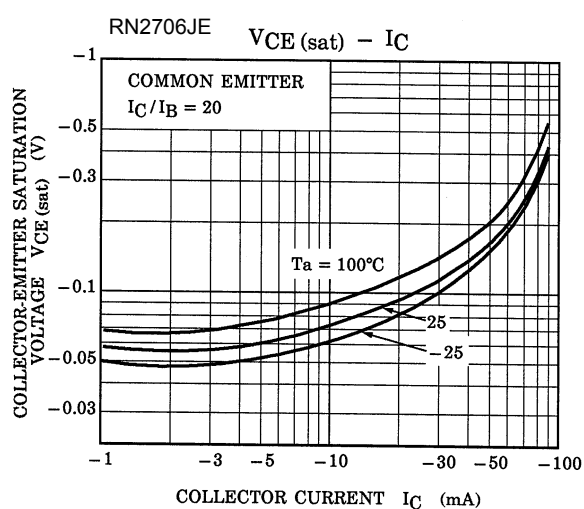
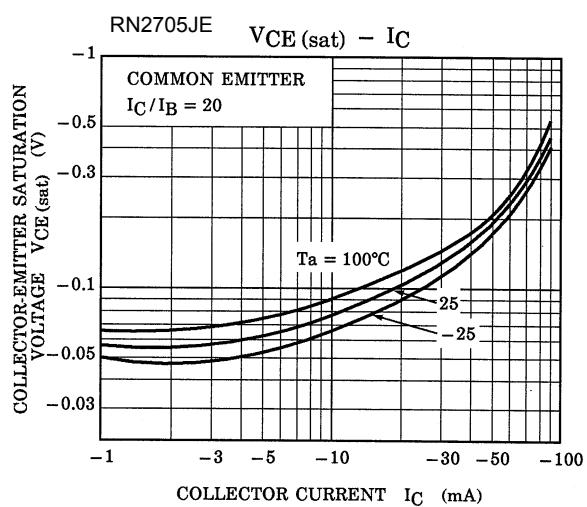
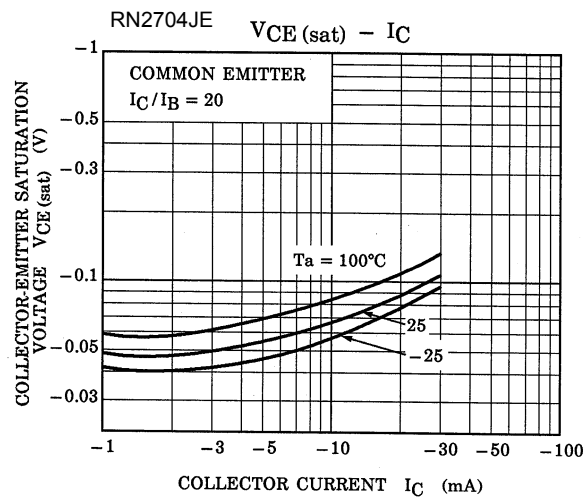
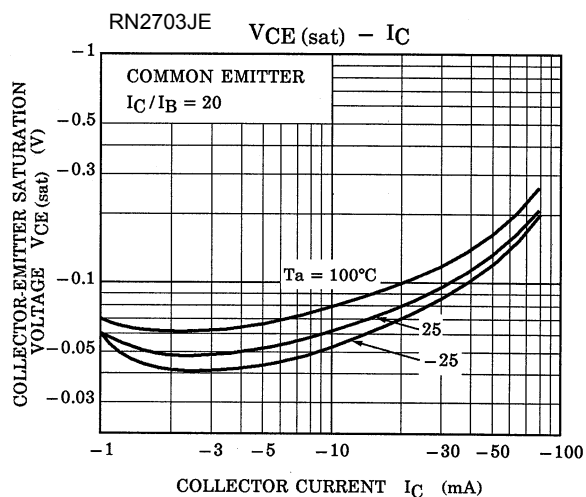
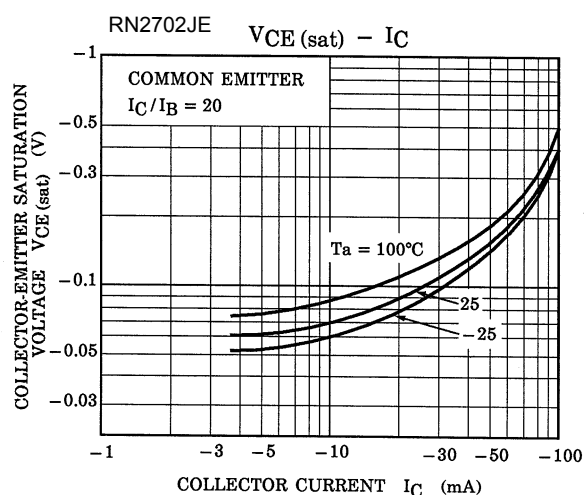
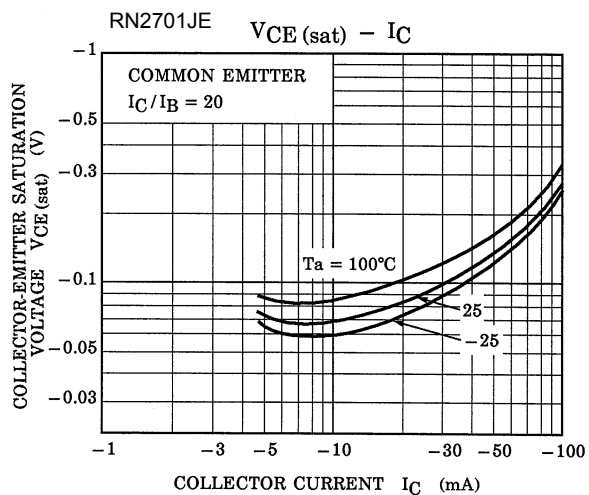
## Q1, Q2 Common

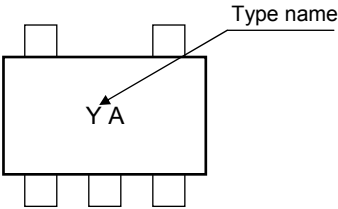
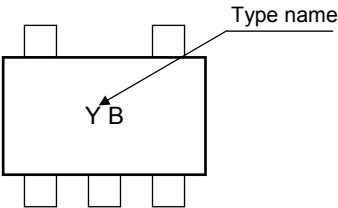
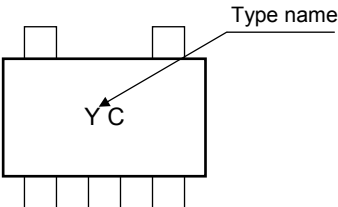
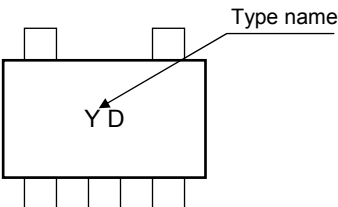
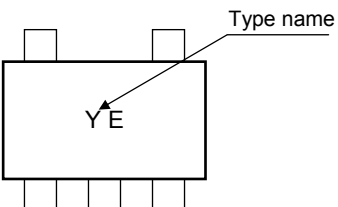
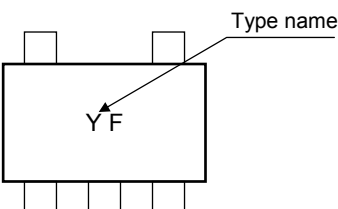


## Q1, Q2 Common







Type Name	Marking
RN2701JE	 <p>A rectangular component with four pins on each of the long sides. The marking 'YA' is in the center. An arrow points from the text 'Type name' to the 'A' in 'YA'.</p>
RN2702JE	 <p>A rectangular component with four pins on each of the long sides. The marking 'YB' is in the center. An arrow points from the text 'Type name' to the 'B' in 'YB'.</p>
RN2703JE	 <p>A rectangular component with four pins on each of the long sides. The marking 'YC' is in the center. An arrow points from the text 'Type name' to the 'C' in 'YC'.</p>
RN2704JE	 <p>A rectangular component with four pins on each of the long sides. The marking 'YD' is in the center. An arrow points from the text 'Type name' to the 'D' in 'YD'.</p>
RN2705JE	 <p>A rectangular component with four pins on each of the long sides. The marking 'YE' is in the center. An arrow points from the text 'Type name' to the 'E' in 'YE'.</p>
RN2706JE	 <p>A rectangular component with four pins on each of the long sides. The marking 'YF' is in the center. An arrow points from the text 'Type name' to the 'F' in 'YF'.</p>

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